ABSTRACT

Systems and methods for analyzing very low concentrations of analyte molecules (e.g., sub-part per trillion or, even, single molecule detection) utilizing a tunable substrate for surface-enhanced resonance Raman scattering. Surface characteristics of a substrate are tuned to optimize overlap of surface plasmon resonance wavelength (SPRW) spectra of the substrate, the excitation bandwidth of an excitation source, and Raman scattered wavelengths of an analyte molecule.